

We claim:

1. Maraging steel with improved machinability, good weldability, and high corrosion resistance, containing (in % by weight)

0.02 - 0.075 % carbon;

0.1 - 0.6 % silicon;

0.5 - 0.95 % manganese;

0.08 - 0.25 % sulfur;

phosphorus present up to a maximum of 0.04 %;

12.4 - 15.2 % chromium;

0.05 - 1.0 % molybdenum;

0.2 - 1.8 % nickel;

vanadium present up to a maximum of 0.15 %;

0.1 - 0.45 % copper;

aluminum present up to a maximum of 0.03 %;

0.02 - 0.08 % nitrogen; and

residual iron, and impurities caused in manufacturing, which steel has a ferrite percentage of less than 28 % by volume.

2. The steel according to claim 1 further including at least one additional alloying element up to a maximum of 2.0 % by weight.

3. The steel according to claim 1 containing 0.80 - 0.90 % manganese and 0.10 - 0.16 % sulfur.

4. The steel according to claim 1 containing 13.8 - 15.0 % chromium.

5. The steel according to claim 1 containing 14.1 - 14.7 % chromium.

6. The steel according to claim 1 containing 0.25 - 1.6 % nickel.

7. The steel according to claim 4 containing 0.25 - 1.6 % nickel.

8. The steel according to claim 1 containing 0.35 - 1.1 % nickel.

9. The steel according to claim 4 containing 0.35 - 1.1 % nickel.

10. The steel according to claim 1 containing 0.8 - 1.0 % nickel.
11. The steel according to claim 4 containing 0.8 - 1.0 % nickel.
12. The steel according to claim 1 containing 0.25 - 0.35 % copper.
13. The steel according to claim 7 containing 0.25 - 0.35 % copper.
14. The steel according to claim 9 containing 0.25 - 0.35 % copper.
15. The steel according to claim 11 containing 0.25 - 0.35 % copper.
16. The steel according to claim 1 comprising a ferrite percentage of up to 15 % by volume.
17. The steel according to claim 1 comprising a ferrite percentage of up to 10 % by volume.
18. The steel according to claim 1 comprising a ferrite percentage of up to 6 % by volume.
19. A process for heat treatment of a maraging steel with improved machinability, which process produces an object that is through-hardened even with a large cross-section, comprising subjecting a steel block with a composition (in % by weight) of
 - 0.02 - 0.075 % carbon;
 - 0.1 - 0.6 % silicon;
 - 0.5 - 0.95 % manganese;
 - 0.08 - 0.25 % sulfur;
 - phosphorus present up to a maximum of 0.04 %;
 - 12.4 - 15.2 % chromium;
 - 0.05 - 1.0 % molybdenum;
 - 0.2 - 1.8 % nickel;
 - vanadium present up to a maximum of 0.15 %;
 - 0.1 - 0.45 % copper;
 - aluminum present up to a maximum of 0.03 %;
 - 0.02 - 0.08 % nitrogen; and
 - residual iron, and impurities caused in manufacturing,

to an annealing treatment for formation and adjustment of a ferrite percentage in the steel;

thereafter hot forming with an at least 4-fold degree of deformation;

thereafter soft annealing; and

thermal tempering with at least one hardness treatment and at least one draw treatment.

20. The process according to claim 19 wherein the annealing treatment for the formation and adjustment of a ferrite percentage is performed between 1080°C and 1350°C for at least 12 hours.

21. The process according to claim 20 wherein the annealing treatment is performed for at least 24 hours.

22. The process according to claim 19 wherein the annealing treatment provides a ferrite content up to a maximum of 28 % by volume.

23. The process according to claim 19 wherein the annealing treatment provides a ferrite content up to a maximum of 15 % by volume.

24. The process according to claim 19 wherein the annealing treatment provides a ferrite content up to a maximum of 10 % by volume.

25. The process according to claim 19 wherein the annealing treatment provides a ferrite content up to a maximum of 6 % by volume.

26. The process according to claim 19 wherein the steel (in % by weight) contains at least one of 13.8 - 15.0 % chromium and 0.25 - 1.6 % nickel.

27. The process according to claim 26 wherein the steel (in % by weight) contains 14.1 - 14.7 % chromium.

28. The process according to claim 26 wherein the steel (in % by weight) contains 0.35 - 1.1 % nickel.

29. The process according to claim 26 wherein the steel (in % by weight) contains 0.8 - 1.0 %, nickel.

30. The process according to claim 27 wherein the steel (in % by weight) contains 0.35 - 1.1 % nickel.

31. The process according to claim 27 wherein the steel (in % by weight) contains 0.8 - 1.0 %, nickel.
32. The process according to claim 19 wherein the steel contains 0.25 - 0.35 % by weight copper.
33. The process according to claim 19 wherein the steel includes at least one additional alloying element up to a maximum of 2.0 % by weight.
34. A frame construction for plastic molds comprising the steel according to claim 1.
35. A forged piece with a thickness of at least 0.32 m and a cross-sectional area of at least 0.1 m², heat-treated according to the process recited in claim 19.
36. A mold part fabricated by machining, said mold part comprising a steel according to claim 1.
37. A mold part fabricated by machining, said mold part comprising a steel produced by the process recited in claim 19.